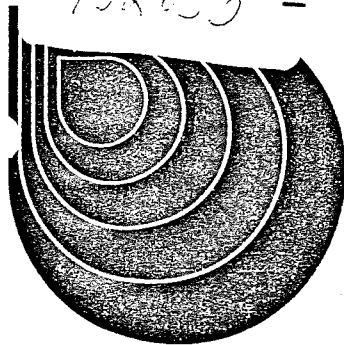


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Niagara
Project
Expansion

Power Authority
of the State
of New York



STUDY OF SOILS, WATER QUALITY AND GROUND WATER QUALITY

Results of Preliminary Study and Description of Additional Studies

Final Draft

March 1983

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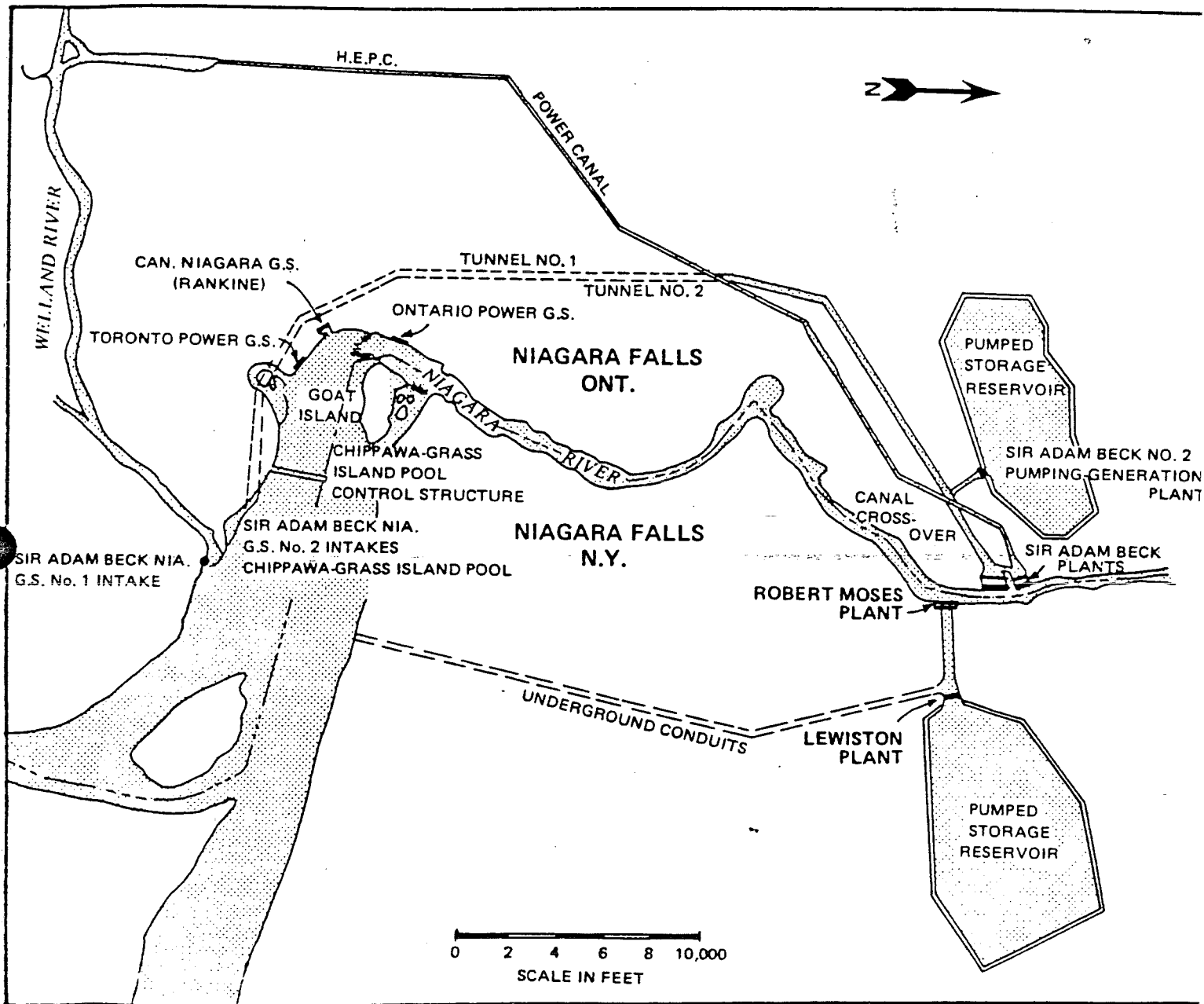
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1. INTRODUCTION

The New York Power Authority has proposed expansion of its Niagara Power Project located in the town of Lewiston, New York on the Niagara River (see Figure 1). The project expansion would involve adding new generating units to the Robert Moses and Lewiston Power Plants at two sites located on the north side of the project's forebay (see Figure 2). The Robert Moses expansion site includes a portion of the land at 5715 Old Lewiston Road owned by the Stauffer Chemical Company, formerly the site of a chemical manufacturing plant. Figure 2 shows the approximate overlap of the Stauffer property with the Robert Moses expansion site.

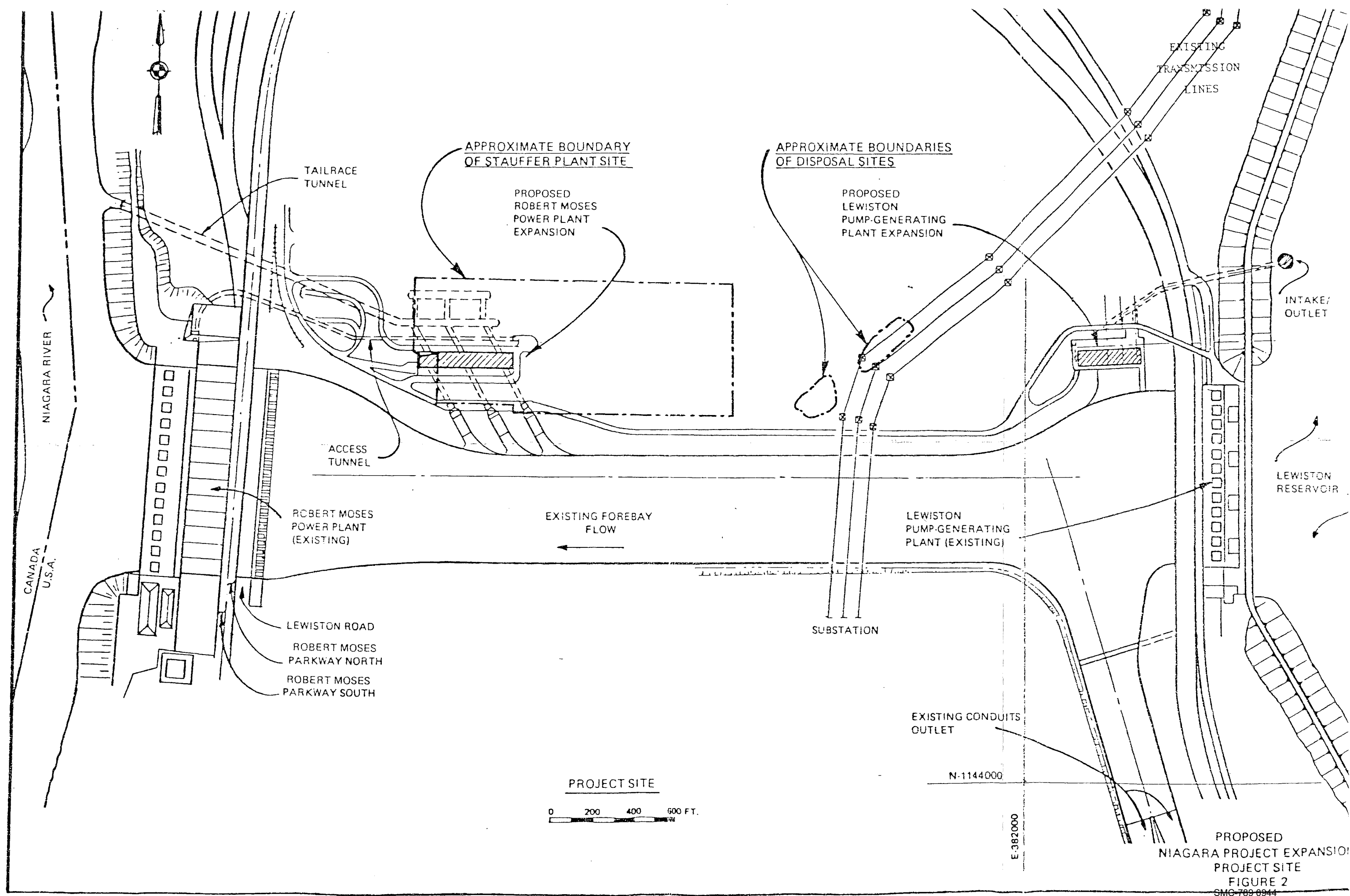
Between 1969 and 1974 Stauffer disposed of various wastes at two locations on Authority property that are near the expansion sites. These two waste disposal sites are inactive and are not expected to be disturbed by the expansion.

Based on information available to date, the Authority does not anticipate significant environmental effects from the excavation of a portion of the Stauffer Chemical property for the Niagara Project Expansion. However, a study of soils, surface water quality, and ground water quality has begun to determine whether any conditions exist that would result in harmful effects to public health or safety from the proposed expansion. This study is a part of the environmental studies being done in conjunction with preparation of an application for an amendment to the Niagara Power Project License which would authorize the expansion. It is expected that this application will be filed with the Federal Energy Regulatory Commission in early 1984.



LOCATION OF THE NIAGARA POWER PROJECT

FIGURE 1



2. THE SOILS, WATER QUALITY, AND GROUND WATER QUALITY STUDY

The purpose of this study is to determine whether hazardous chemical contamination exists at the Stauffer-owned property. If such contamination is found, the study will also evaluate the extent of the contamination and whether the proposed construction may cause migration of such contamination off the site such that harmful effects to public health or safety would occur. The study will also estimate whether the proposed construction will cause any hazardous chemical contamination that might be present at the nearby inactive waste disposal sites to enter surface or ground waters and adversely affect public health and safety.

The information obtained in the study will be used to develop a plan for remedial action, if necessary: to ensure worker safety during both construction and operation of the project expansion; to ensure proper disposal of any hazardous materials excavated during construction; and to prevent the project expansion from causing surface or ground water to become contaminated by hazardous chemicals.

The study has been divided into three phases. The first phase, which has been completed, consisted of preliminary information gathering and analyses of available or readily obtainable soil and water samples to provide information with which to design more detailed sampling and analytical programs. The second phase will consist of sampling and analysis to determine whether and to what extent potentially hazardous chemical contamination exists in the study area. The third phase will consist of the development of a remedial action plan, if necessary.

This report presents the results of the preliminary data gathering phase. It also describes additional work that will be undertaken in the second phase of the study. This report is prepared to provide

background information and to serve as a basis for review of the Authority's study program.

3. STUDY CRITERIA

In order to establish criteria against which the data collected could be measured, Federal and State regulations dealing with hazardous material and water quality were reviewed. Both New York State and Federal Law identify hazardous wastes. Management of hazardous wastes within New York is governed, with respect to State law, by Article 27 of the New York Environmental Conservation Law and Parts 360 to 366 of the New York Code of Rules and Regulations, which are administered by the Department of Environmental Conservation ("NYS DEC"). Federal regulation of hazardous solid waste is the responsibility of the Environmental Protection Agency ("EPA") pursuant to the Resource Conservation and Recovery Act of 1976, as amended (RCRA). EPA's hazardous solid waste regulations are set forth in 40 C.F.R. Section 260 et seq. These statutes and regulations identify chemicals and certain concentrations of concern. Development of the Authority's study program has been based on state and federal identification of hazardous wastes and information on past use of the Stauffer property.

4. RESULTS OF PRELIMINARY STUDIES

a. The Stauffer Chemical Company Property

The Niagara Smelting Company owned and operated a plant at the Lewiston site between 1918 and 1946. In 1930 the Stauffer Chemical Company obtained an interest in the Niagara Smelting Company and by 1946 had acquired the entire company.

From 1930-1976, the Stauffer facility was used for the production of the products listed in Table 1. Production ceased in 1976. Building demolition pursuant to a NYS DEC permit was

Table 1

STAUFFER CHEMICAL COMPANY LEWISTON FACILITY PRODUCTS

(Source: Reference 5)

<u>Principal Products</u>	<u>Process</u>	<u>Production Dates</u>
Chlorine, caustic soda, hydrogen	Electrolysis of brine	1930-1972
CCl_4 (carbon tetrachloride)	Chlorination of carbon disulfide	1930-1976
SiCl_4 (silicon tetrachloride)	Chlorination of silica	1940-1976
ZrCl_4 (zirconium tetrachloride)	Chlorination of zirconium dioxide	1974
TiCl_4 (titanium tetrachloride)	Chlorination of titanium dioxide	1958
TiCl_3 (titanium trichloride)	Reduction of TiCl_4	1958
SbCl_3 (antimony trichloride)	Chlorination of antimony	1972
Al_2Cl_6 (aluminum chloride)	Chlorination of alumina	1942-1965
Chloroacetic acid	Chlorination of acetic acid	1964-1965

Table 1 (Continued)

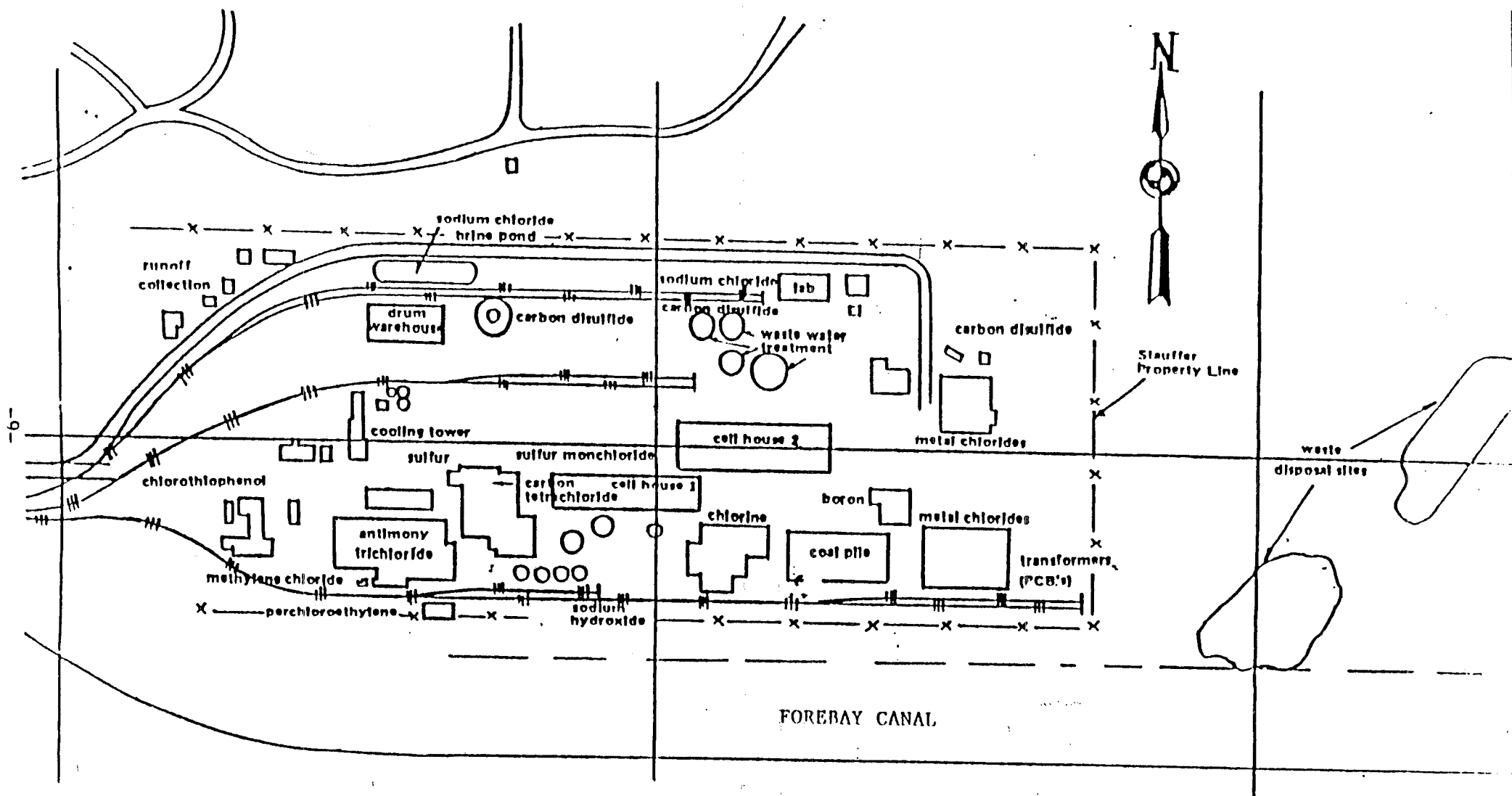
STAUFFER CHEMICAL COMPANY LEWISTON FACILITY PRODUCTS

<u>Principal Products</u>	<u>Process</u>	<u>Production Dates</u>
p-Chlorobenzene thiol	Presumed to be by reduction of chloro- benzene sulfonyl chloride using zinc catalyst and sulfuric acid	1963-1965.
Sulfur	Byproduct of CCl_4 production	1930-1976
BCl_3	Chlorination of boron oxide	1969
Perchloroethylene	Repackaged from tank cars to drums, etc.	Not known
Methylene dichloride	Repackaged from tank cars to drums, etc.	Not known

completed in 1982. Figure 3 provides known information about the locations on the plant site where various substances were handled, stored, or produced by Stauffer. Research is underway to obtain information on feedstocks, operations, and products of the Niagara Smelting Company prior to 1930.

✓ The Stauffer plant discharged wastewater into the Niagara River via a pipe to an outfall located downstream from the Robert Moses Plant. Stauffer was required to have a State Pollutant Discharge Elimination System (SPDES) Permit. The most recent Stauffer SPDES permit was issued by NYS DEC in April, 1979. It remains in effect until April 1, 1984. Discharges into the Niagara River are subject to limits on fecal coliform and to monitoring of chlorine and carbon tetrachloride. Analyses are performed on samples taken quarterly by Stauffer and reported to NYS DEC.

In addition, the Niagara County Health Department performed a radiological survey of the roadways within the Stauffer property limits on March 6, 1981. It reported evidence of radioactive materials under the asphalt roadbeds with readings from 10 to 30 microrem/hr at a one meter height above the surface. Background levels in the Niagara Falls area are about 12.5 ± 8 microrem/hr. The source of the radioactivity appears to be phosphate slag used to construct the underlayment of the roadways. This was a common practice in the Niagara Falls area. The slag material is from natural rock which is rich in phosphates and rare earth metals. Uranium and radium are trace contaminants of these rocks. The Health Department indicated that this slag material could remain on the site and did not require any remedial action.



APPROXIMATE LOCATIONS OF VARIOUS
PRODUCTION PROCESSES AT THE
STAUFFER CHEMICAL COMPANY
LEWISTON PLANT

FIGURE 3

b. Inactive Waste Disposal Sites

On January 27, 1970, the Stauffer Chemical Company obtained a permit from the Niagara County Health Department for disposal of various materials, typically broken concrete, graphite, sand, scrap, sulfur, occasional wood pallets, and plant road and yard sweepings at two disposal sites on Authority-owned land.

The disposal method was to be trenching, with dumping, cover, and compacting to grade, progressively from one end of the trench to the opposite end, in accordance with the regulations then in force. The Health Department has estimated that burial was perhaps eight feet in depth. The location was 600 feet east of the Stauffer Chemical Company, according to Stauffer's application, and approximately 200 feet north of the forebay (see Figure 3).

The Stauffer Chemical Company has also reported to an Interagency Task Force (which included US EPA and NYS DEC) that, in addition to the materials named above, the materials placed in the disposal sites included scrap metals, refractory reactor linings, asbestos, coal cinders, and oxides of zirconium, titanium, and silicon. Reportedly, the zirconium, titanium, and silicon oxides were drummed; other materials were landfilled as solids.

The County Department of Health records indicate that Stauffer has stated that because of contact and absorption small quantities of the following substances may have been codisposed of with the materials stated above:

- NaOH and H₂SO₄ (sodium hydroxide and sulfuric acid)
- CCl₄ (carbon tetrachloride)
- CS₂ (carbon disulfide)
- S₂Cl₂ (sulfur chloride)
- ZrCl₄ and SiCl₄ (zirconium and silicon tetrachlorides)

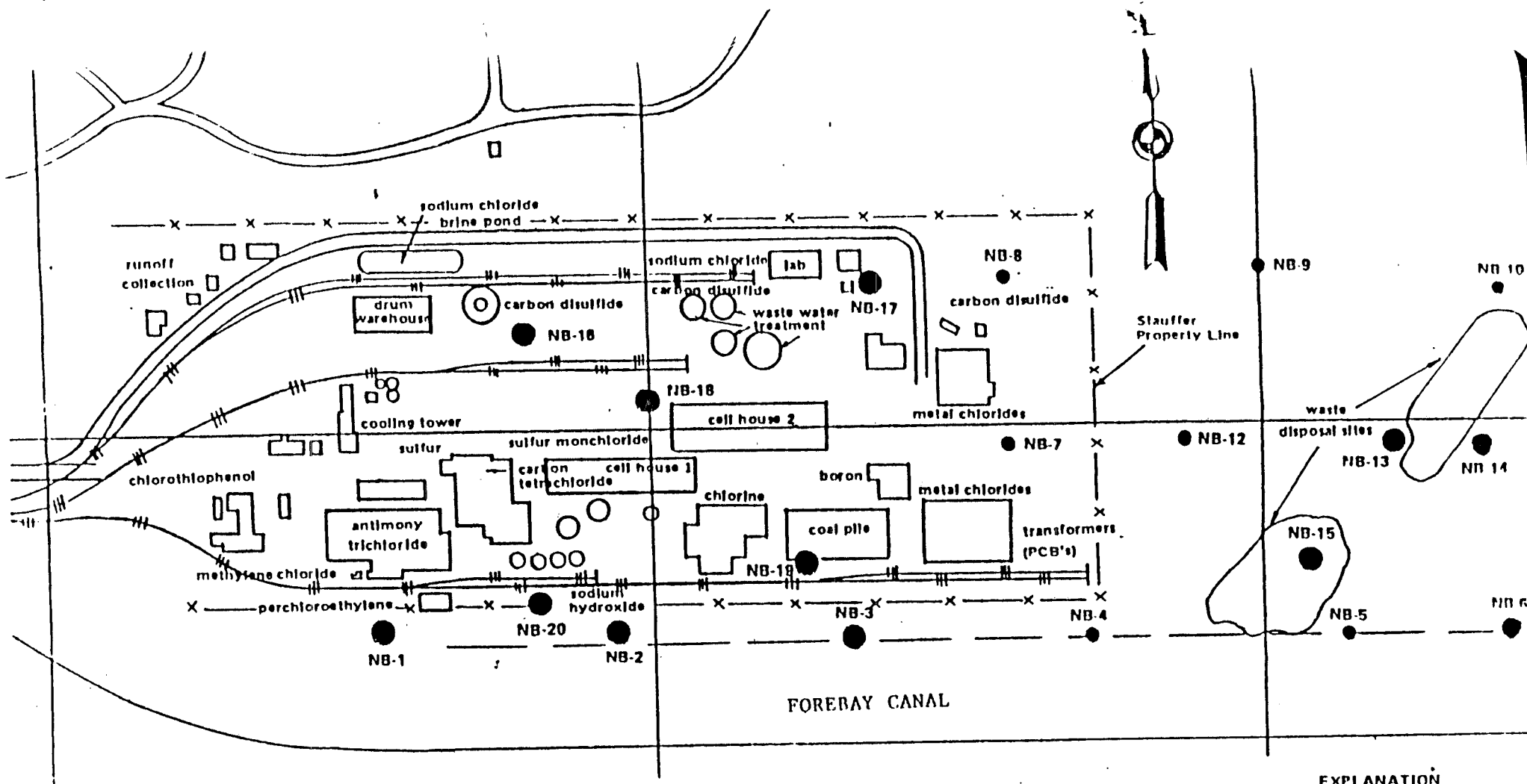
NYS DEC has classified the disposal sites as inactive hazardous waste disposal sites, classification E. According to DEC's classification system, such sites require periodic surveillance and chemical analyses of samples, but no immediate remedial action. The DEC and the State Department of Health inspected these sites in April, 1980 and noted no apparent environmental problems or health hazards. The Niagara County Department of Health inspected the sites in 1981 and noted that material might be leaching from them into the forebay. As noted below, there does not appear to be an effect on water quality in the forebay.

c. Preliminary Analyses of Soil Samples

As part of the study of the geological feasibility of the expansion, twenty boreholes were drilled in January and February of 1982 at the Stauffer property and on Authority property. Since cores from these borings were available, tests for certain substances were performed on some samples in order to obtain information that could be used to plan further studies.* Figure 4 shows a map of the borehole locations.

Various tests were performed. Some composited soil samples were analyzed for EPA priority pollutants. Certain samples with higher concentrations of metals and phenolic-like compounds were analyzed by soil layer.

* These samples were collected as part of the geotechnical investigations, and thus were not preserved or stored in a manner suitable for later testing for volatile chemicals.



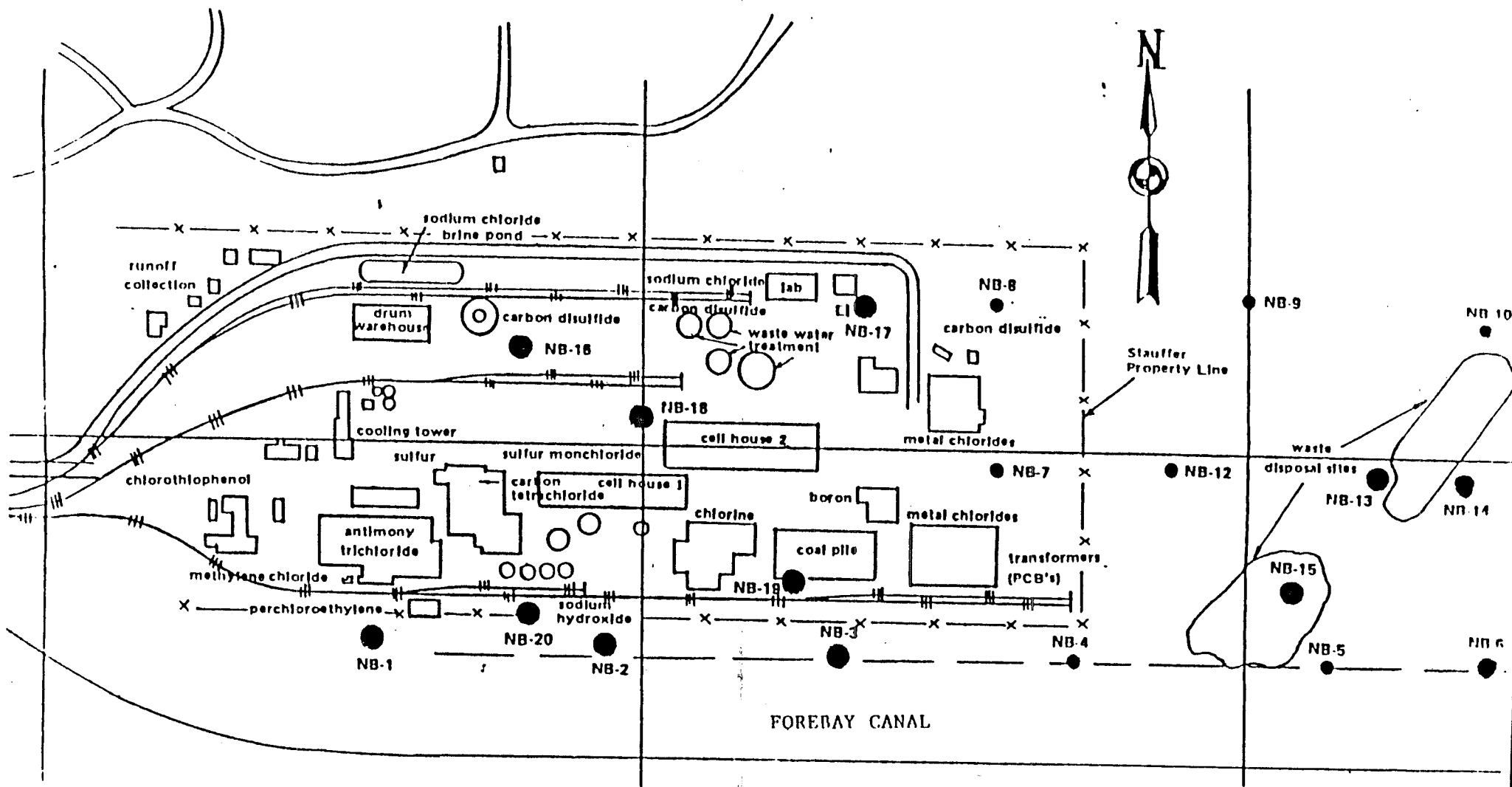
BOREHOLE LOCATIONS

FIGURE 4

EXPLANATION

- NB-12 ● SOIL SAMPLING (AUGER) HOLE
- NB-19 ● ANALYZED SAMPLE

Jan-Feb/72



BOREHOLE LOCATIONS

FIGURE 4

Jan. Feb. 1972

EXPLANATION	
NB-12	SOIL SAMPLING (AUGER) HOLE
NB-19	ANALYZED SAMPLE

The EP Toxicity Test was performed on two samples that showed higher concentrations of metals. This test analyzes leachate from soils and is among the tests established by federal regulations to identify potentially hazardous solid wastes.

Laboratory analyses were conducted following EPA analytical protocols and using the quality assurance/quality control procedures outlined in the EPA Handbook for Analytical Quality Control.

Several metals or metalloids, including antimony, arsenic, cadmium, copper, lead, mercury, nickel, selenium, thallium, zinc, and zirconium were found at various locations. Some may be related to past activities at the Stauffer plant. For others there is no source known at the site; however, since the soil is glacially derived from rocks containing a variety of metalliferous ores, it is possible that many of the metals or metalloids occur naturally at the site.

Conductivity of the soil extracts was high in several samples, indicating concentrations of ionic salts.

✓ Several organic priority pollutants were found at various locations.

The two samples tested using the EP Toxicity Test showed leachate concentrations below the EP Toxicity standards indicating that the samples were not hazardous.

Analysis by soil layer of samples with higher concentrations of metals and phenolic-like compounds indicated that these materials appeared to be concentrated in the upper layers of the soil at the site.

Calculations, estimating maximum concentrations of the pollutants that might be found in dust generated by the construction activity, indicated that the American Conference of Governmental Industrial Hygienists exposure guidelines to ensure worker safety would be met.

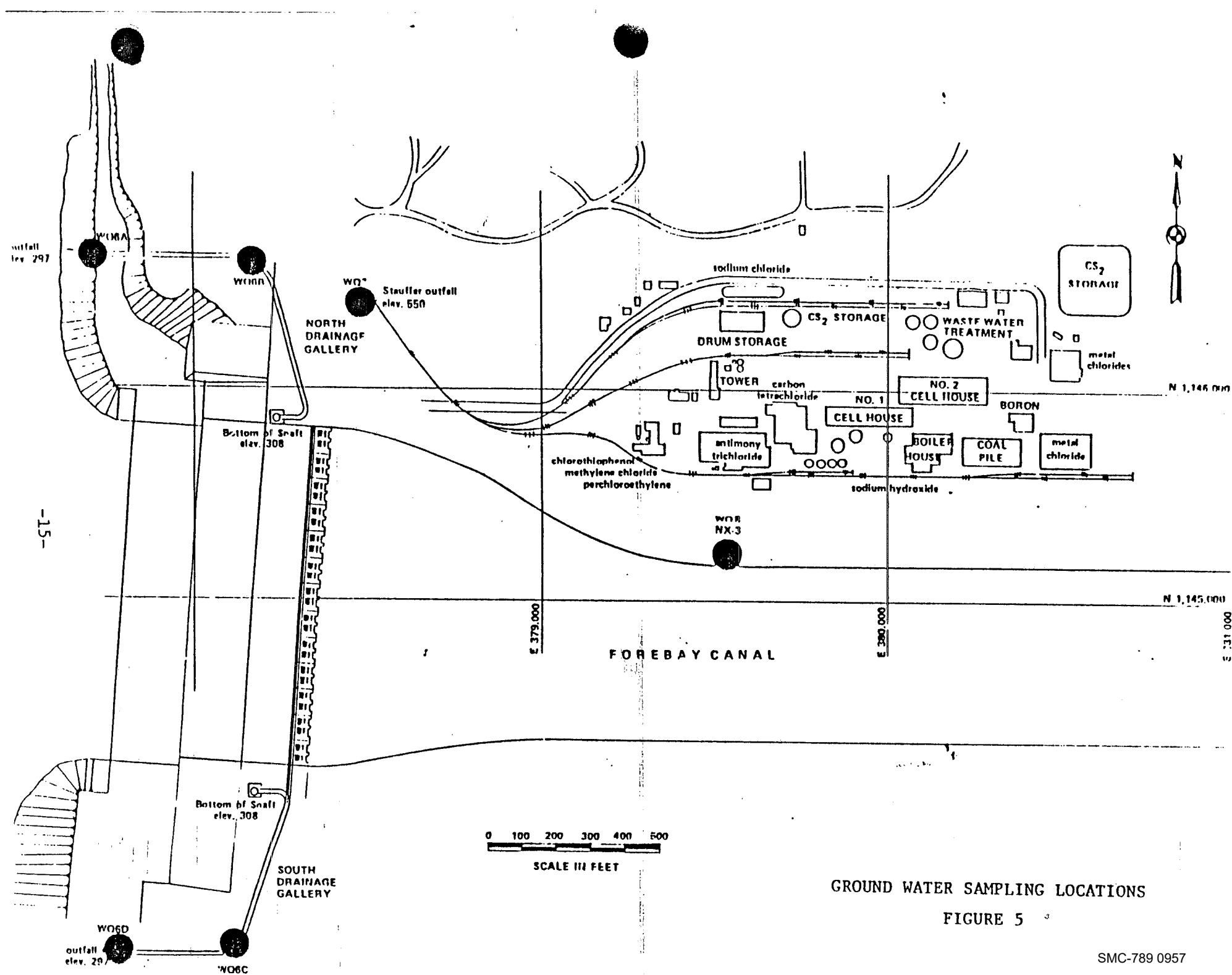
The results of these preliminary analyses have not shown any soil conditions that would render the Stauffer property unsuitable for construction of the Niagara Project Expansion. Additional sampling and analysis is necessary to determine whether any conditions exist at the site that would require remedial action during construction or operation of the project expansion.

d. Preliminary Analyses Of Ground And Surface Water Samples

Ground Water Ground water samples were taken from a borehole located between the Stauffer property and the forebay, from drainage galleries located north and south of the Robert Moses Plant (whose purpose is to draw ground water away from the structure), and from the Stauffer outfall. These samples were analyzed for EPA priority pollutants and other water quality parameters. Figure 5 shows the location of the ground water samples.

Ground water chloride levels were sometimes higher than expected for waters from the upper Lockport dolomite aquifer (Reference 1), and were sometimes higher than the 250 ppm threshold for classification of these waters as Class GSA ground waters.

✓ Chloroform and carbon tetrachloride were also found in the ground water samples. Carbon tetrachloride was a product at the Stauffer plant. However, both substances show up in samples



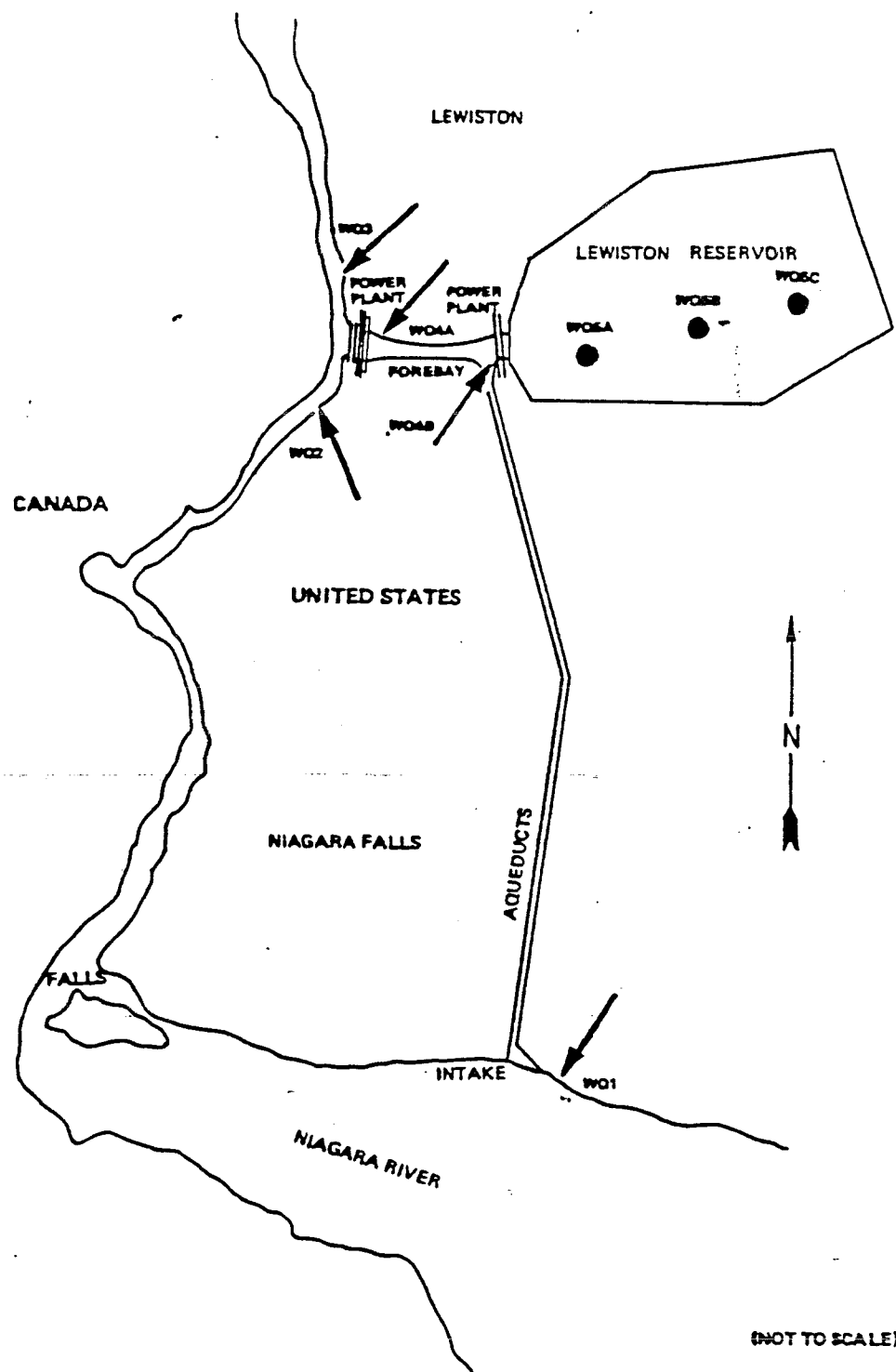
collected from the drainage galleries located both north and south of the forebay and could be entering the site as contaminants of ground water from other sources.[?] Methylene chloride, which was repackaged at the plant, was also detected in some samples.

Surface Water Surface water samples were taken from the Niagara River above and below the project and from the project waters - the conduit, the forebay, and the reservoir. The sampling locations are shown in Figure 6. Samples were analyzed for EPA priority pollutants and other water quality constituents. Analysis of these samples indicates that the waters at all sampling locations are similar in quality and that there does not appear to be any effect from leaching or runoff from the Stauffer property or the inactive waste disposal sites.

A more extensive discussion of the data and analytical results can be found in Reference 3.

5. INTERIM CONCLUSION

The information collected to date on the former uses of the area north of the forebay of the Niagara Project which includes the Robert Moses and Lewiston plant expansion sites, together with the preliminary analyses of soil and ground and surface water samples, has revealed no immediate hazard to the health and safety of the public that would make the proposed site unsuitable for construction of the Niagara Project expansion. Additional studies will be conducted to determine whether any conditions exist at the site that would require remedial action in order to protect the health and safety of construction workers or the public and to protect the environment. These additional studies are described in the next section of this report.



**SURFACE WATER
SAMPLING LOCATIONS**

FIGURE 6

6. DESCRIPTION OF ADDITIONAL STUDIES

The second phase of the study program will consist of detailed sampling and analysis to determine whether and to what extent potentially hazardous chemical contamination exists in the study area. The information obtained in the second phase of the study program will be used in the third phase of the study program, if necessary, to develop a plan for remedial action to ensure worker and public safety during both construction and operation of the project expansion, to ensure proper disposal of any hazardous materials excavated during construction, and to prevent the project expansion from causing surface water or ground water to become contaminated by hazardous chemicals.

The second phase of the study program will be divided into two concurrent field investigation programs; one for the inactive waste disposal sites and one for the Stauffer property.

✓ Waste Disposal Sites The Niagara Project Expansion is not expected to disturb or modify physically the two disposal sites, or to change the movement of ground water through these sites. The disposal sites will be within a restricted area during construction of the expansion. They will be fenced, and contractors will be prohibited from doing any work that would adversely disturb the sites. The field investigation program for these sites has as its initial objective the determination of what is entering and what is leaving the sites through ground water movement.

Stauffer Property Construction of the proposed expansion of the Robert Moses Plant will require excavation of a portion of the Stauffer property. Other portions of the property may be used for equipment or material storage. The field investigation is designed to provide data for evaluation of the extent, amount, and rate of movement of any hazardous wastes currently present; and for evaluation of any changes that may occur as a result of the construction or operation of the project expansion.

The field investigation will consist of a geophysical survey using ground probing radar (GPR), a seepage sampling program, and subsurface investigations using monitoring wells and soil borings.

The scope of field data collection proposed includes the use of soil and ground water samples for determination of geochemical and contaminant parameters. In addition, the direction of the ground water flow, and the potentiometric levels and hydraulic conductivity in the upper three aquifers will be determined. The exact vertical profile of these aquifers is not known and will be field determined. Since it is not currently known whether significant vertical or horizontal contamination of ground water has occurred, investigation of the upper three aquifers has been chosen as a reasonable way to examine the vertical and horizontal contamination profiles.

Sampling locations have been selected based on one or more of the following considerations:

- Natural topographic or geological features (e.g., seep samples can only be taken where seeps occur).
- Preliminary indications that contamination may be present.
- The data requirements imposed by the need to determine the extent, amount, and rate of movement of any contamination found.
- The need to obtain background water quality data on water flowing into the site.

Chemical analyses and archiving of the samples will be performed based on one or more of the following considerations:

- The need to determine what may be entering the site via ground water transport.
- Preliminary indications that contamination may be present from feedstocks, intermediates, or products used or produced at the Stauffer Chemical Company or disposed by Stauffer at the waste disposal sites.
- Archiving (i.e., careful storage under defined conditions) must allow for later determinations at locations at which partial analyses are initially performed on collected samples.

Table 2 shows the list of chemicals which will be analyzed for in the seepage, soil, and ground water samples. In addition, at some locations to be determined after the initial analyses have been performed, gas chromatograph-mass spectrometry scans may be performed to ascertain whether additional contaminants, not included in Table 2, are present at the site.

All field investigations will be performed in accordance with appropriate safety standards. Laboratory analyses will be conducted in accordance with EPA approved or standard laboratory procedures and EPA/DEC quality assurance/quality control protocols.

Reports will be prepared on the field investigation program. As the study proceeds, the Authority will consult with NYS DEC and other agencies. Information and findings from the investigation also will be made available to the public. It is expected that the field program will begin in spring 1983 with results available in fall 1983.

Table 2

CHEMICALS ANALYSIS PARAMETERS

<u>Parameters or Species</u>	<u>Reason for Inclusion</u>	<u>Seepage Collection Samples</u>	<u>Soil Samples from all Borings</u>	<u>Ground Water</u>
Cl ⁻	X	Yes	No	Yes
NO ₃ ⁻	G	Yes	Yes	Yes
SO ₄ ⁻²	G	Yes	No	Yes
HCO ₃ ⁻	G	Yes	No	Yes
K ⁺	G	Yes	No	Yes
Na ⁺	X	Yes	No	Yes
Mg ⁺²	G	Yes	No	Yes
Ca ⁺²	G	Yes	Yes	Yes
As	W	Yes	Yes	Yes
Pb	W	Yes	Yes	Yes
Fe ^{TOTAL}	X	Yes	Yes	Yes
B	W	Yes	Yes	Yes
Zr	W	Yes	Yes	Yes
Sb	W	Yes	Yes	Yes
CS ₂	W	Yes**	Yes	Yes
Mn	W	Yes	Yes	Yes
TOTAL SULFIDE	W	Yes	No	Yes
PCB's	W	Yes	Yes	Yes
Perchloroethylene	W	Yes**	Yes	Yes
CHCl ₃	W	Yes**	Yes	Yes
Methylene Chloride	W	Yes**	Yes	Yes
CCl ₄	W	Yes**	Yes	Yes
p-Cl-thiophenol	W	Yes	Yes	Yes
Total Organic Carbon	W	Yes	No	Yes
Total Organic Halogen	W	Yes	No	Yes

Table 2 (Cont'd)

CHEMICALS ANALYSIS PARAMETERS

<u>Parameters or Species</u>	<u>Reason for Inclusion</u>	<u>Seepage Collection Samples</u>	<u>Soil Samples from all Borings</u>	<u>Ground Water</u>
pH	X	Yes	Yes	Yes
Specific Conductance	G	Yes	No	Yes

G: Needed for determination of ground water characteristics

W: Prior plant operations may have generated this waste

X: Both G and W

** If feasible (based on seepage rate)

References

1. Ground Water in the Niagara Falls Area, New York; pages 18, 37, et seq.; Richard H. Johnston; State of New York Conservation Department Water Resources Commission Bulletin GW-53; 1964.
2. Niagara Project Expansion: Preliminary Analyses of Project Site Soil Samples, Bechtel, 1982.
3. Niagara Project Expansion: Preliminary Analyses of Project Site Surface Water and Ground Water Samples, Bechtel, 1982.
4. Proposed Scope of Work for Assessment of Potential Chemical Contamination for the Niagara Power Expansion Project of the Power Authority of the State of New York, Bechtel, February 1983.
5. NYS DEC Interagency Report file data and meeting with Stauffer Chemical Company on 8/18/82.